



**TRS Medor startup**

## TRS Medor



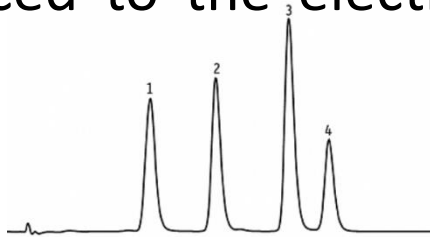
This Gas Chromatograph (GC) is an online analyzer for continuous monitoring of sulfur compounds present in air (i.e.,  $H_2S$ , Mercaptans, DMS, DMDS, ...)

- Analysis principles
- Internal modules presentation
- Installation
- Software
- Calibration
- Service
- Preventive maintenance
- Troubleshooting
- Remote control
- Chromatotec Technical website

# Analysis principles

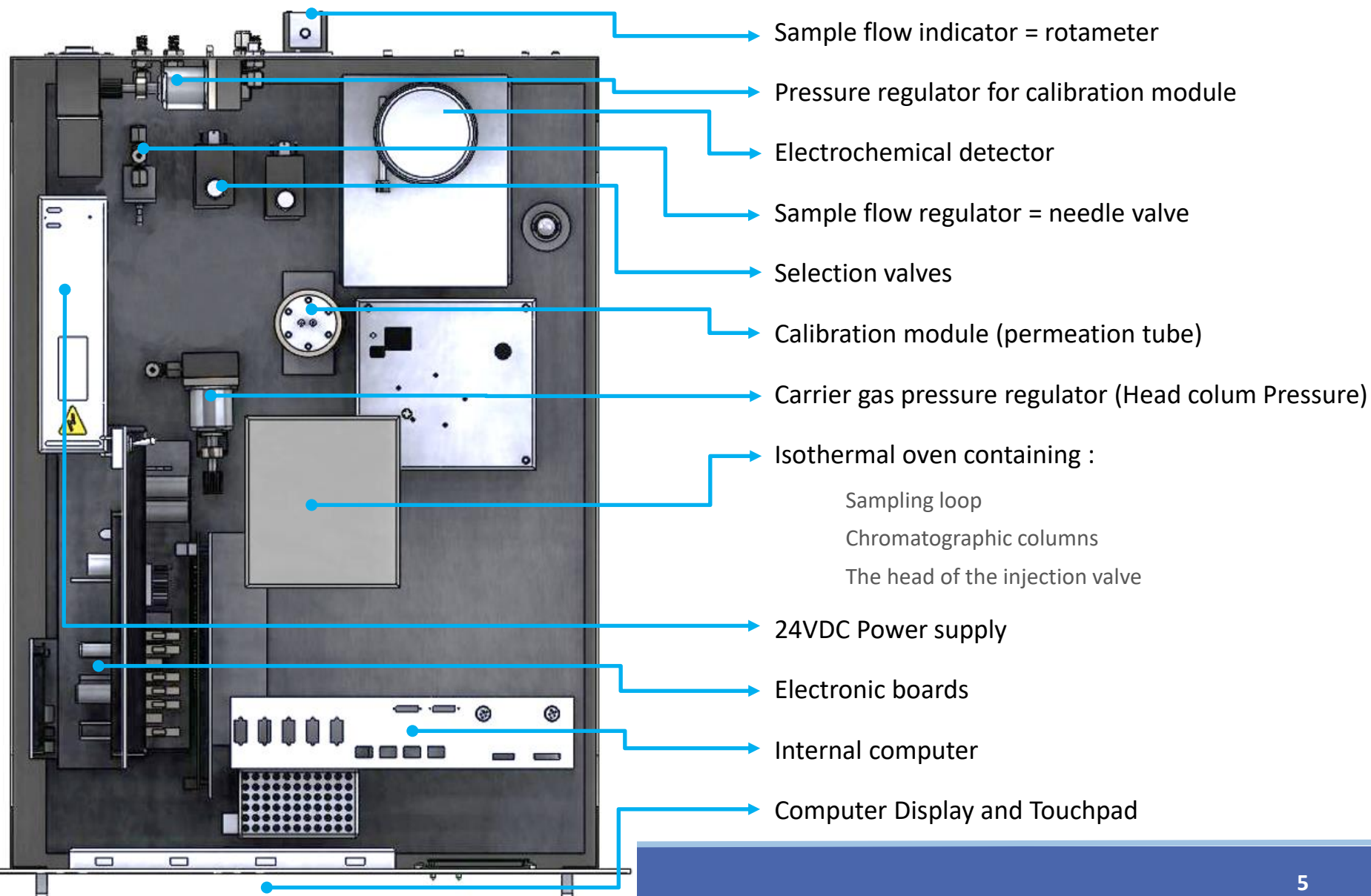


- The air is sampled from outside (ambient air/air from process chimney...) using a sampling pump
- The air sampled must be at ambient pressure
- The sample is injected from a sampling loop into the columns
- The sample travels through the columns, to separate the sulfur compounds, and is introduced to the electrochemical cell for the detection of sulfur species.



- The detection is achieved by a gas-liquid reaction, specific to the sulfur compounds.
- An internal DMS permeation tube is used to calibrate the instrument in automatic mode. Calibration gas available all the time.

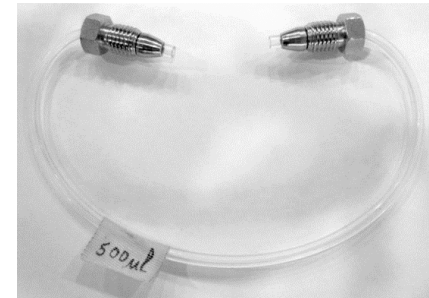
# Top View



# Principle – Sampling mode

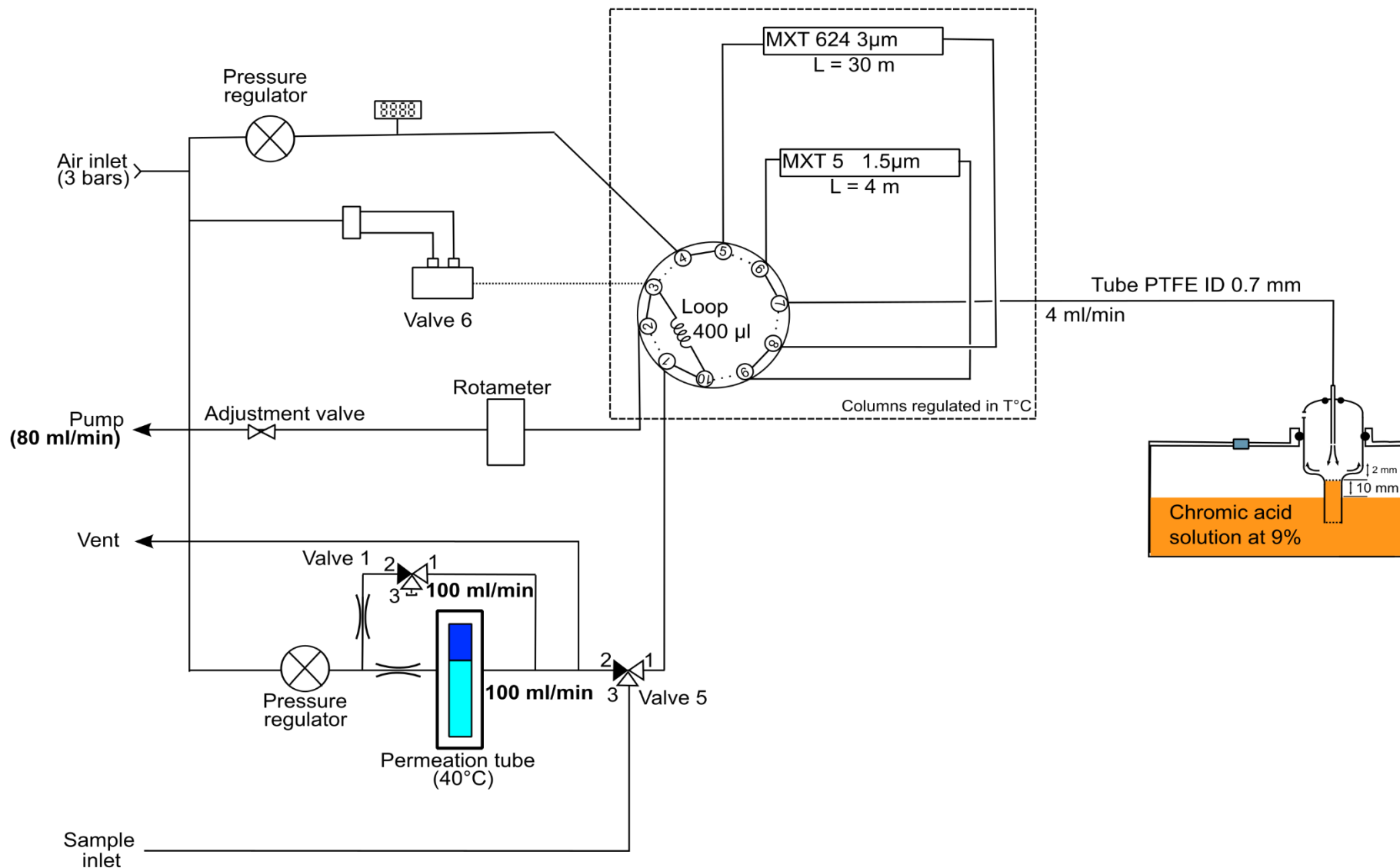
- The sample gas circulation is carried out:

- With a sampling pump
- Flow regulation done by a needle valve
- The sample flushes a sampling loop



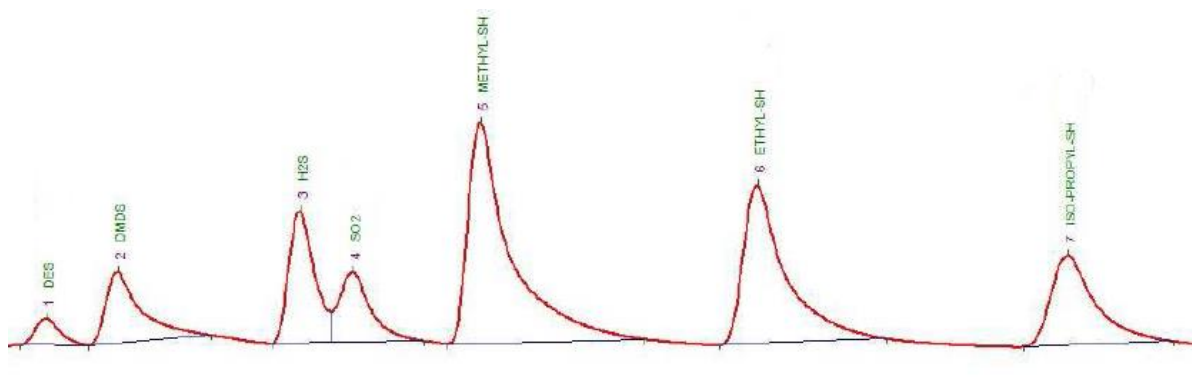
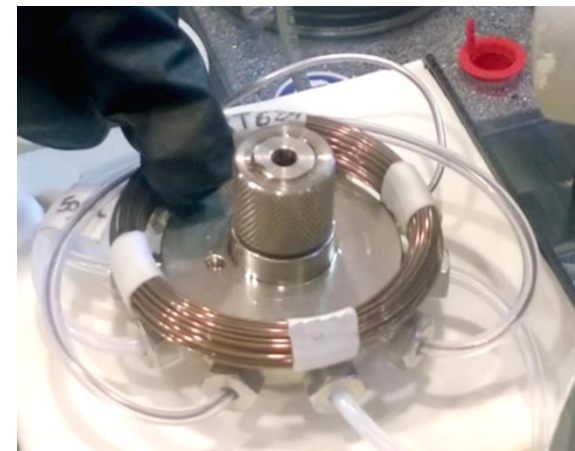
- Carrier gas travels through the column and into the detector.
- Flat signal is emitted by the detector : chromatogram “base line”

# Principle – Sampling mode



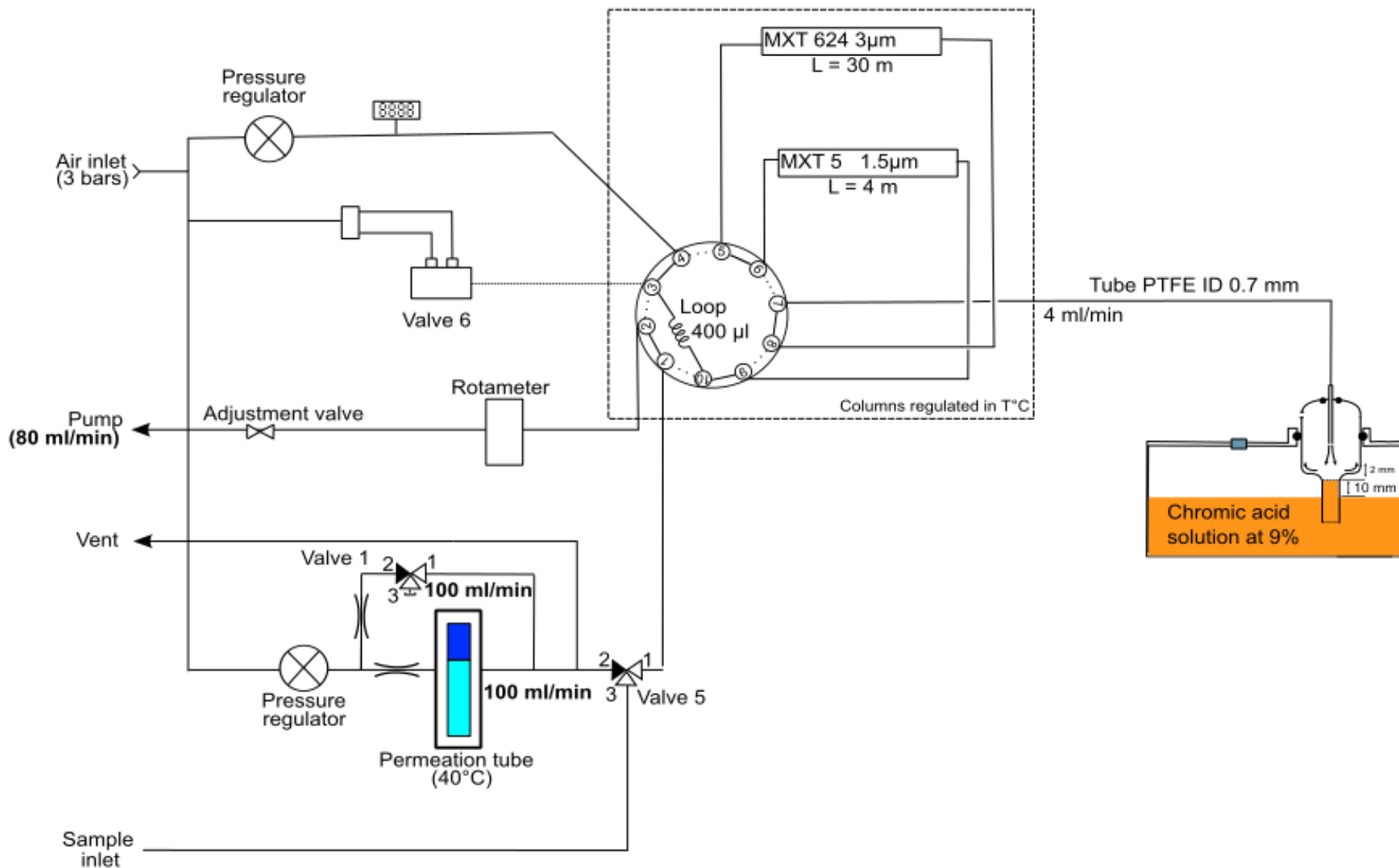
# Principle – Injection mode

- The sample is pushed out of the loop by the carrier gas towards the columns
- Sulfur compounds elute all along the columns and are detected, one by one by the detector
- The signal from the detector increases every time a sulfur compound reaches the detector





# Principle – Injection mode



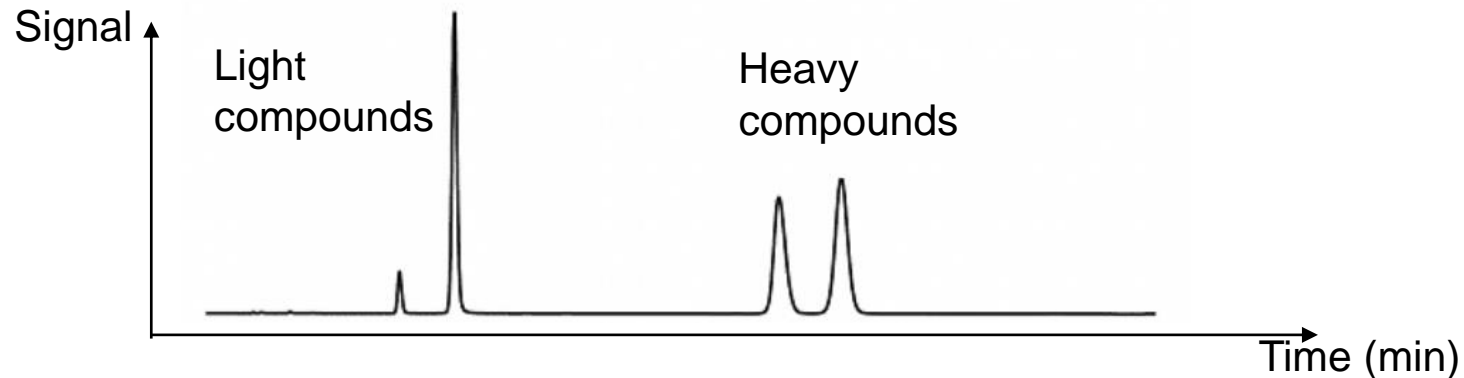
# Principle – Detection

- The sulfurs are detected by the wet cell through a gas-liquid reaction (oxidation-reduction reaction)



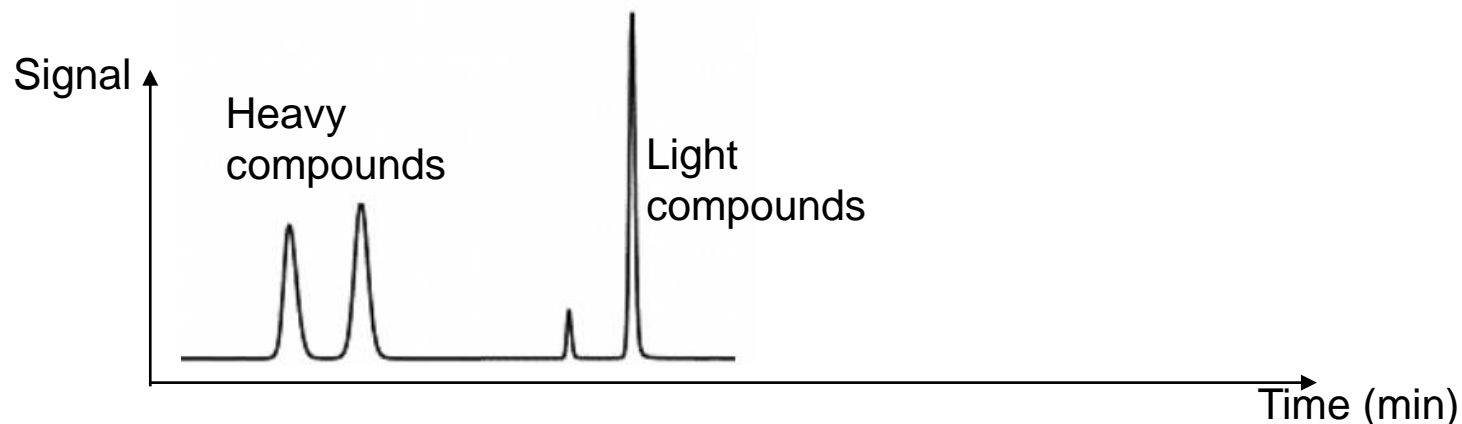
# Principle – Separation specificity

- On a classic GC using only one column



- On the TRS Medor, using 2 columns:

- A short column :  $L=4\text{m}$
- A long column :  $L=30\text{m}$



- Why this separation specificity?
  - Short cycles, more frequent results
  - Separation as good as the « classic one column separation »
  - Isothermal oven : good stability of the system, good RT repeatability
  - Short column used as a « pre-column » : less chance to pollute the long column

# Installation

<u>OPERATING CONDITIONS</u>					
GAS	He (5,5)	H <sub>2</sub> (5,6)	Nitrogen (Nitroxichrom #56881019)		
Inlet pressure	----	----	3 Bars		Ar (6,0)
Used pressure	----	----	CG	Permeation oven	Zero air
Flow rate (ml/min)	----	----	198 (+/-2) hPa	≈ 0.4 bar	----
			CG	Permeation oven	----
			3.5-4	111.04 or 207.80	----

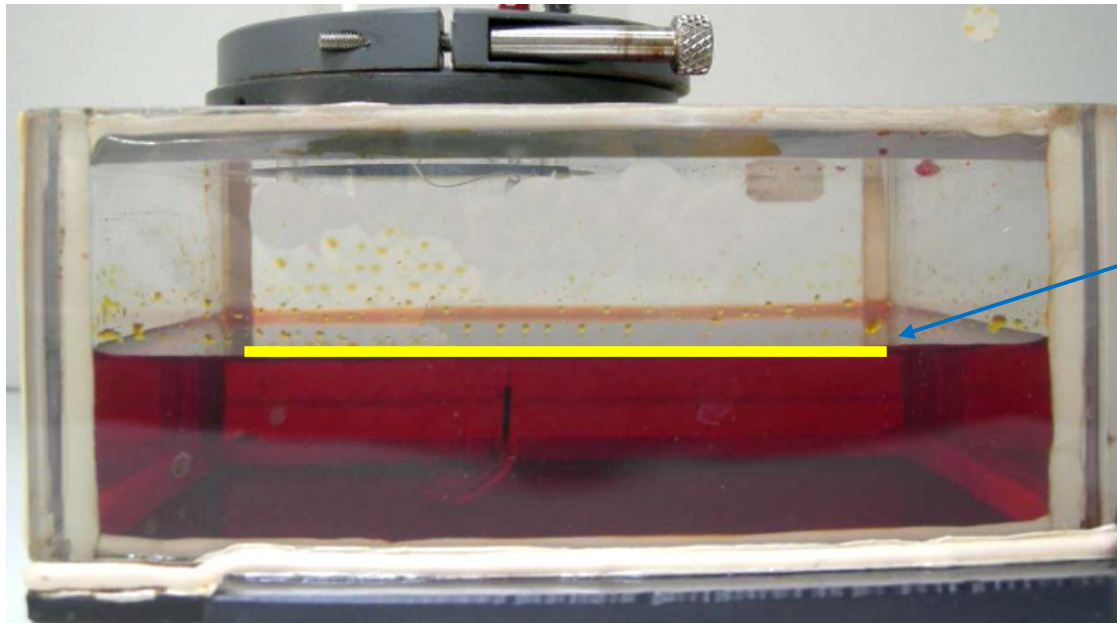
- Before unboxing the Medor
  - Read the QC report (most important document)
  - Read the easy start document
  - Purge the gas generator during one hour! (no connection the generator to the GC)
  - Purge your sampling line during 1 hour ! (no connection the line to the GC)
  - Intelligently select the location for the Medor : no vibration, smooth Air Conditionning...



The damages created by skipping the purge of the generators will not be covered by the warranty!

# Installation – Fill the tank

- Fill the Medor tank with Chromic acid solution (9%)
  - Use appropriate chemical protection equipment: gloves, glasses...
  - Put liquid until reaching the line



Black mark present  
on the tank side

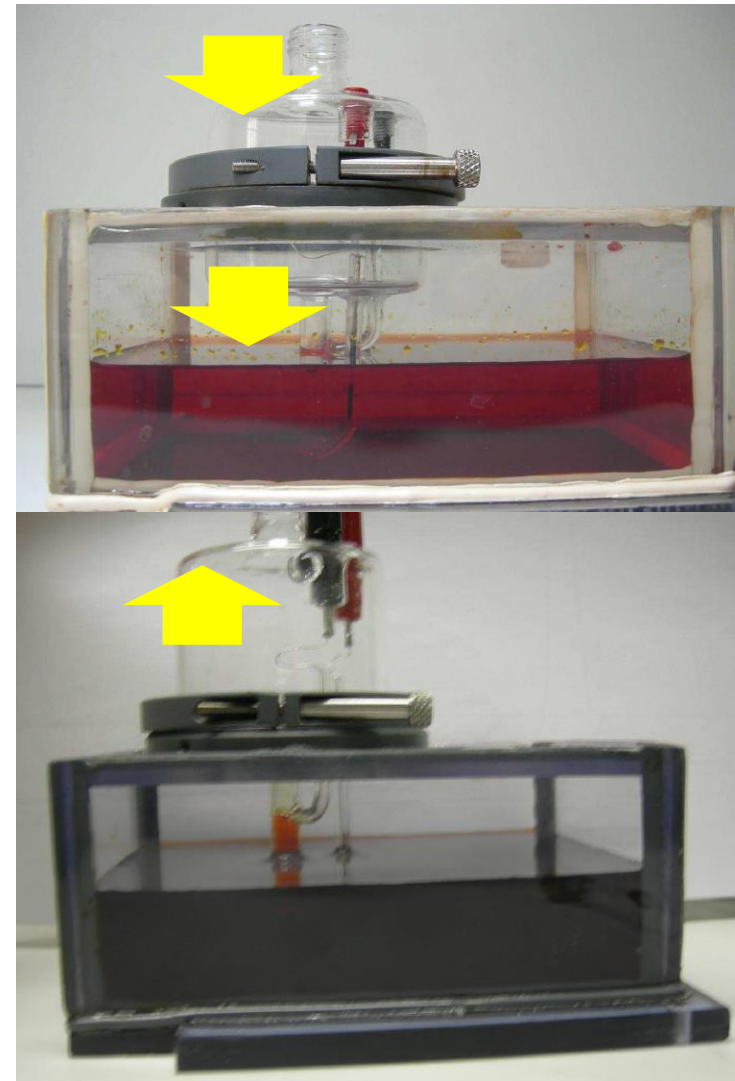
- Check the glass detector is clean and dry
  - Pay attention to the two metallic grids :
    - grids in good condition
    - no dust



Clean grid

# Installation – Put detector in the tank

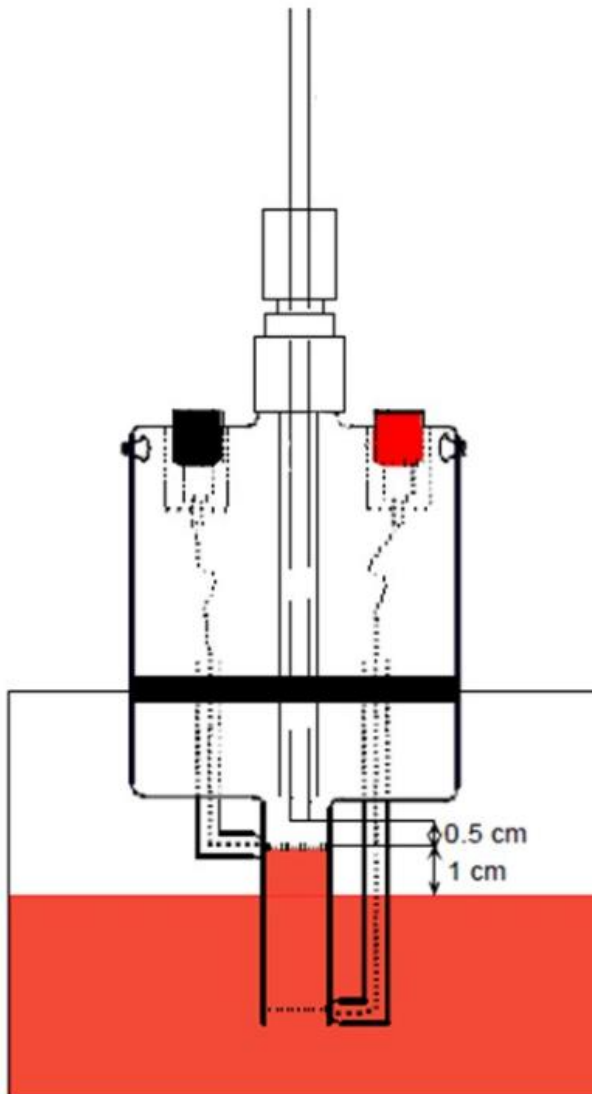
- Gently immerse the detector in the solution, until touching the bottom of the tank
- Then pull the detector up
- Lastly, lock the position of the detector, using the coupling ring





# Installation – Put detector in the tank

- A “perfect” installation should look like that:



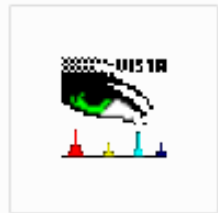
- No gas bubble
- No dust

## Vistachrom Software



- Full analytical control
- Automatic storage of data (sample gas and calibration results)
- Visualization of the results obtained
- Full traceability for quality and audit trail purposes
- Real-time results transmitted via standard transfer protocols

# Software – Log in



## Vistachrom Log in

- Login : "SUPERUSER"
- Password : "1234"

Log in

# Vistachrom

A red chromatogram line with several peaks, positioned to the right of the Vistachrom title.  
The Chromatotec logo, featuring a stylized sun rising over a chromatogram line, with the text "CHROMATOTEC" below it.  

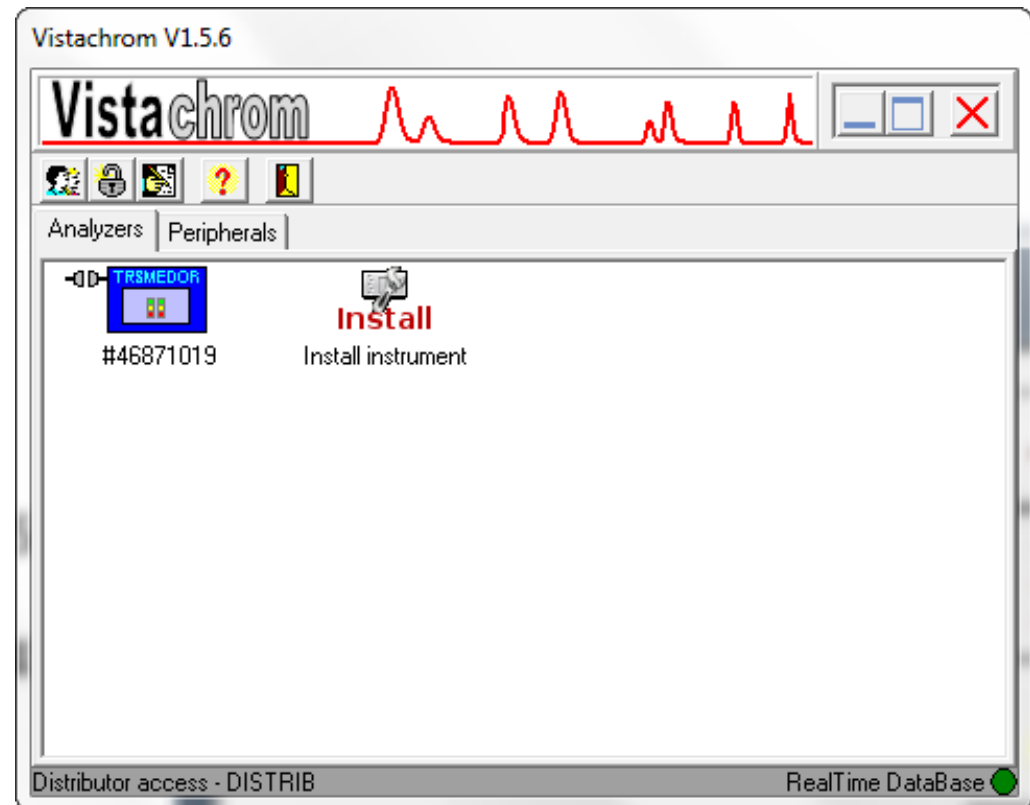
User Name :

Password :

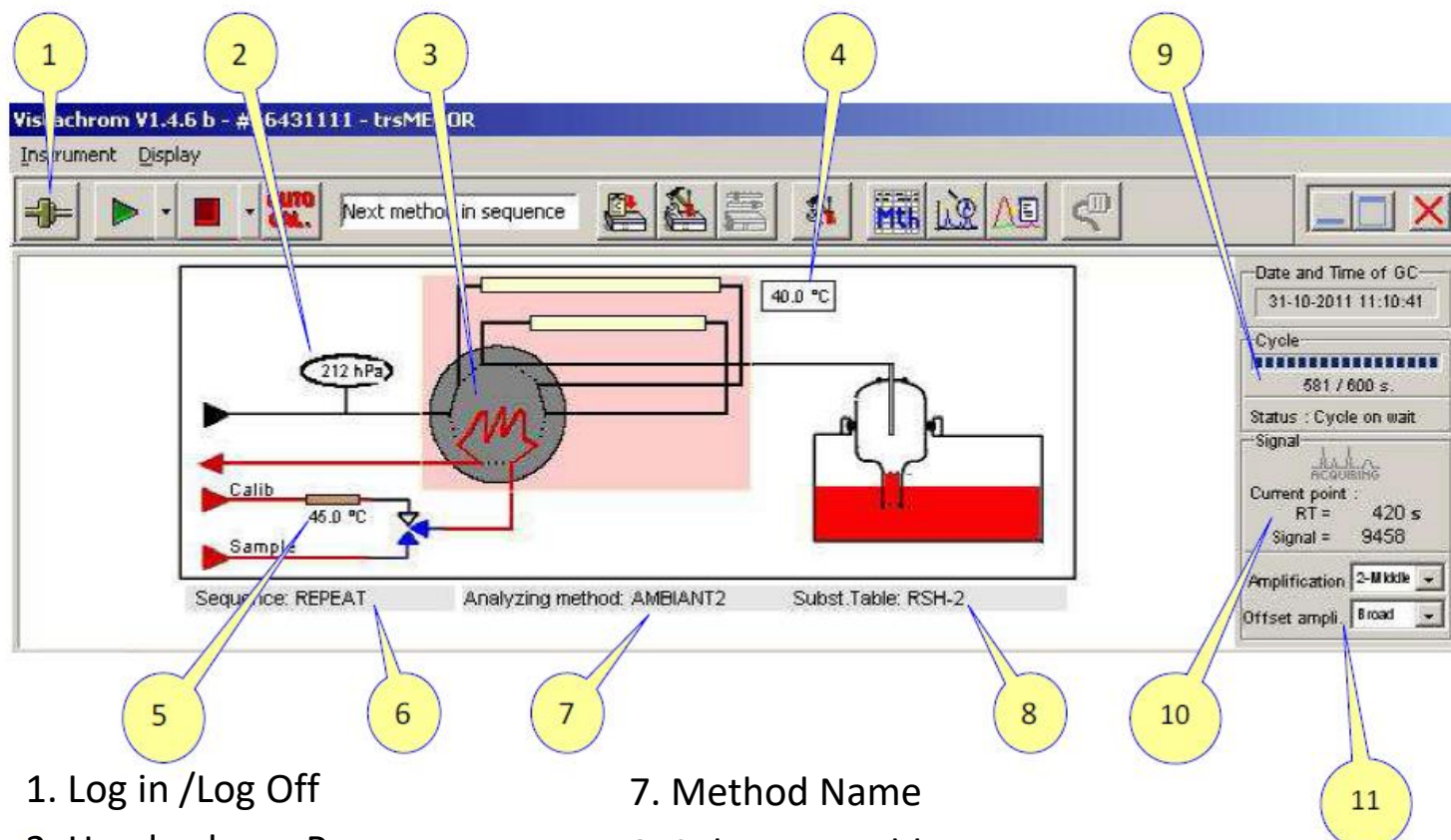
# Software – “Main Window”

## Main Window

- Each GC is identified by the serial number
- Double-click on the SN to open the “GC Window”



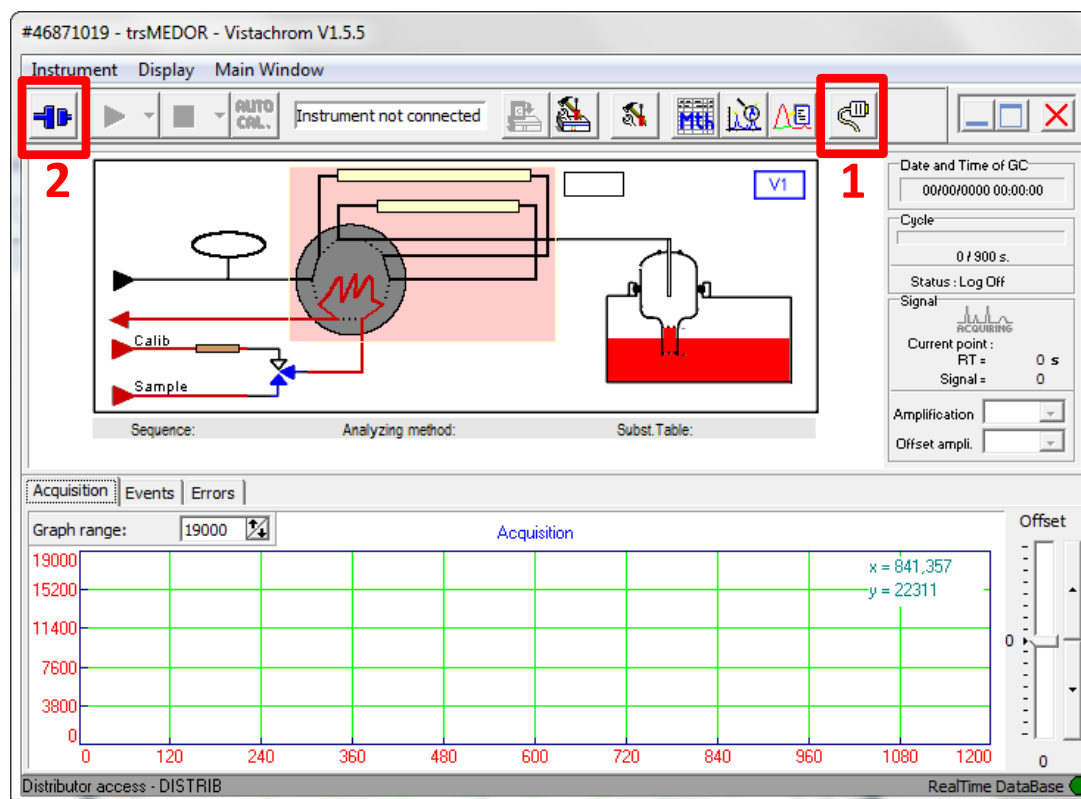
# Software – “GC Window”



# Software – Log on

- GC and computer must be ON
- LEDs on the front panel : “stand by” and “OK” are ON, then:

2. Press on this icon to establish the communication GC-PC



1. Check the COM port is the one used for the communication GC-PC.  
Usually COM3 is used

## Verifications to do, before starting the first cycles

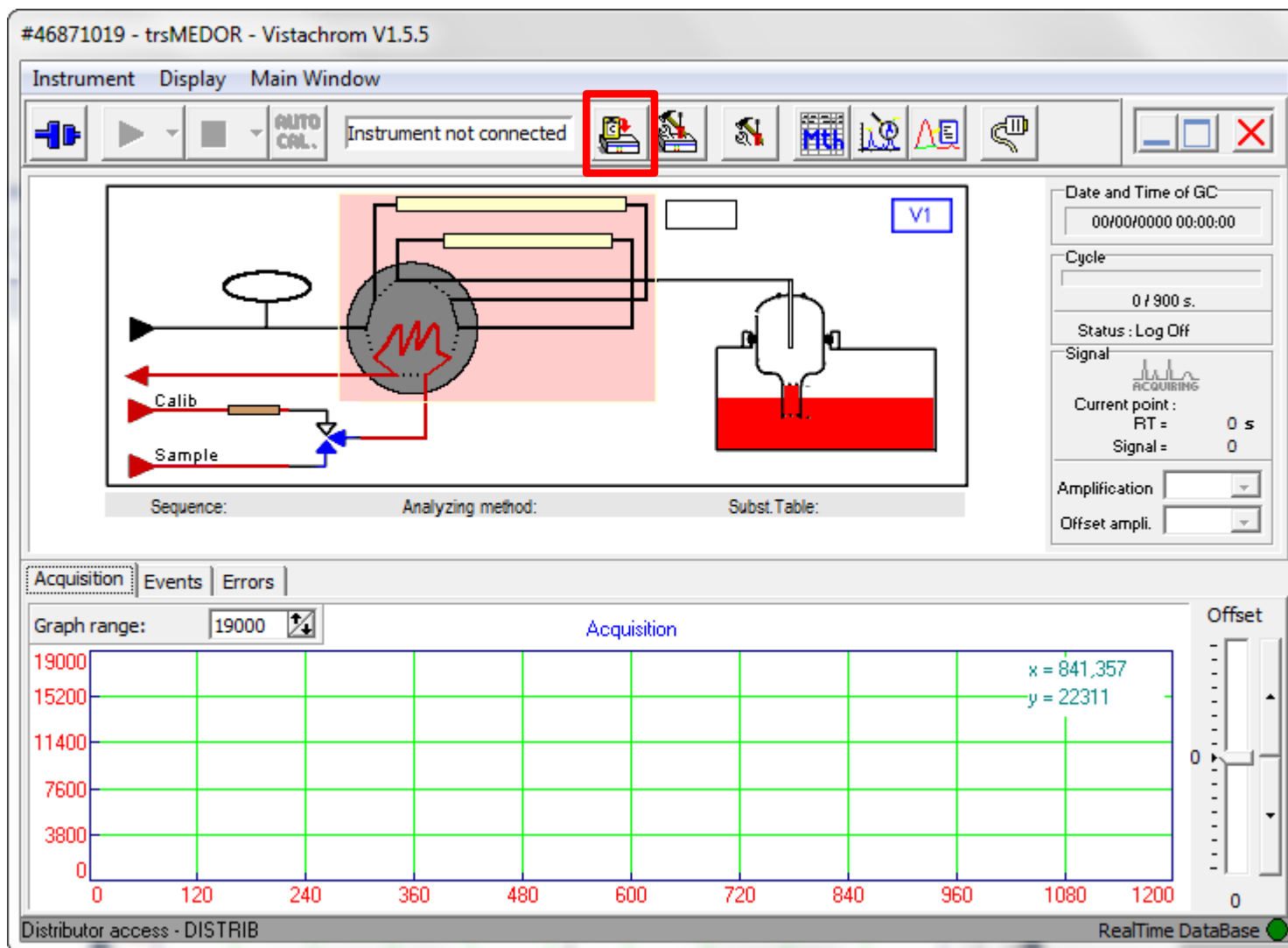
### On the software:

- Head column pressure
- Detector temperature
- Column temperature in stand by

### Physically on the instrument:

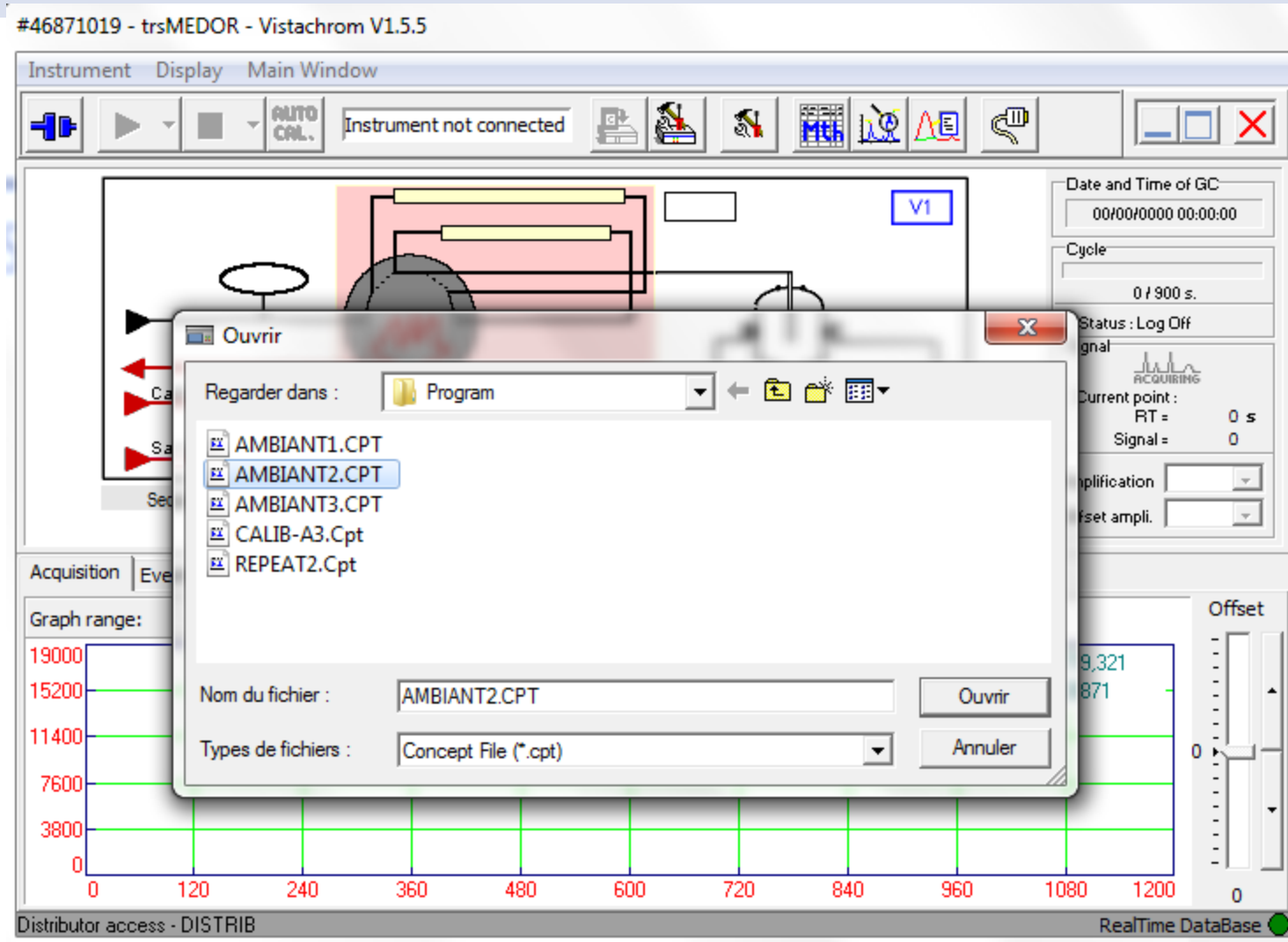
- Was the air generator purged one hour?
- Is the pump ON?
- Sampling flow measurement
- Calibration flows measurements
- Check the air pressure on the GC : 3 bars

# Software – Upload Sequence

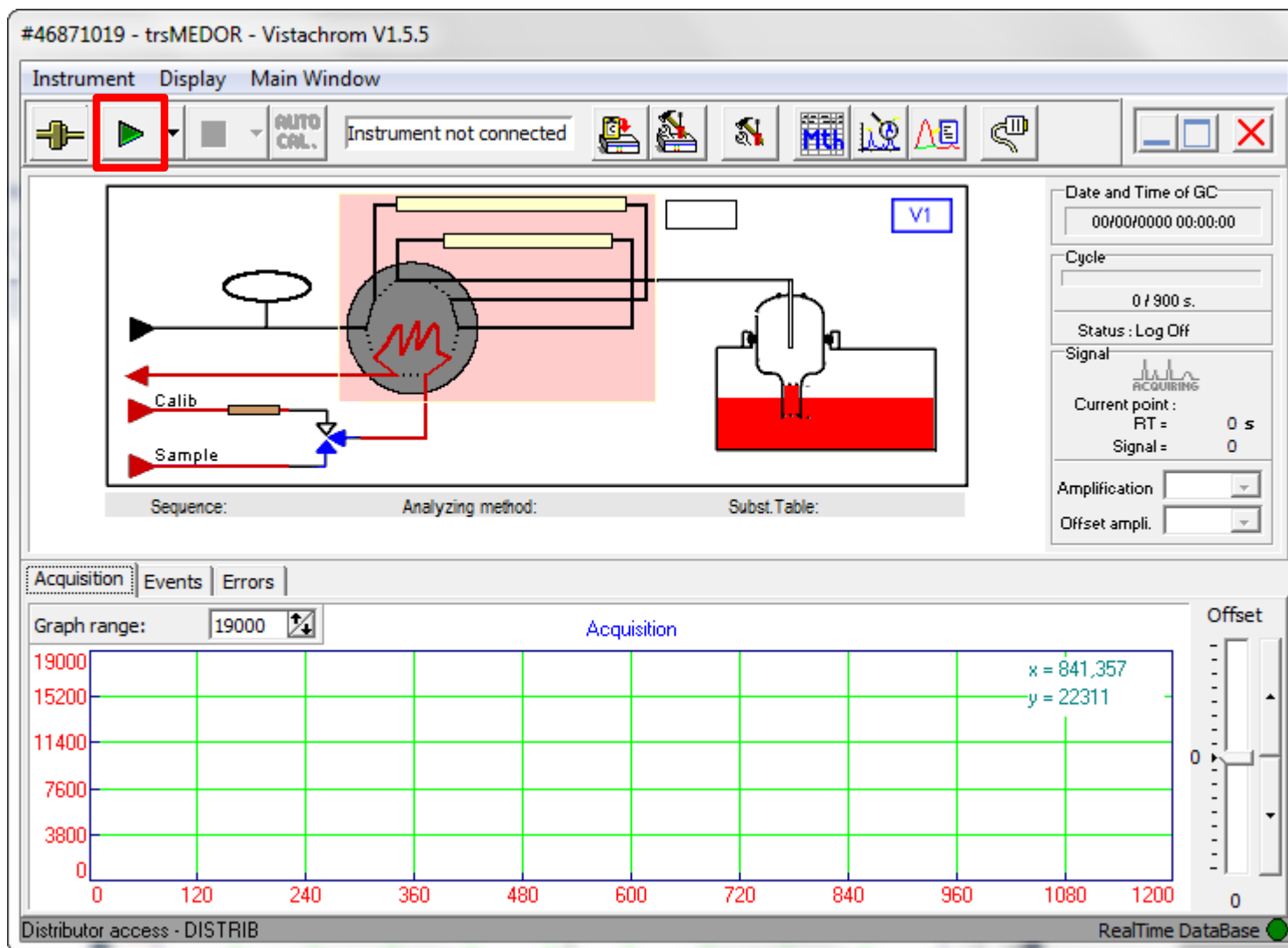




# Software – Upload Sequence



# Software – Start Sequence

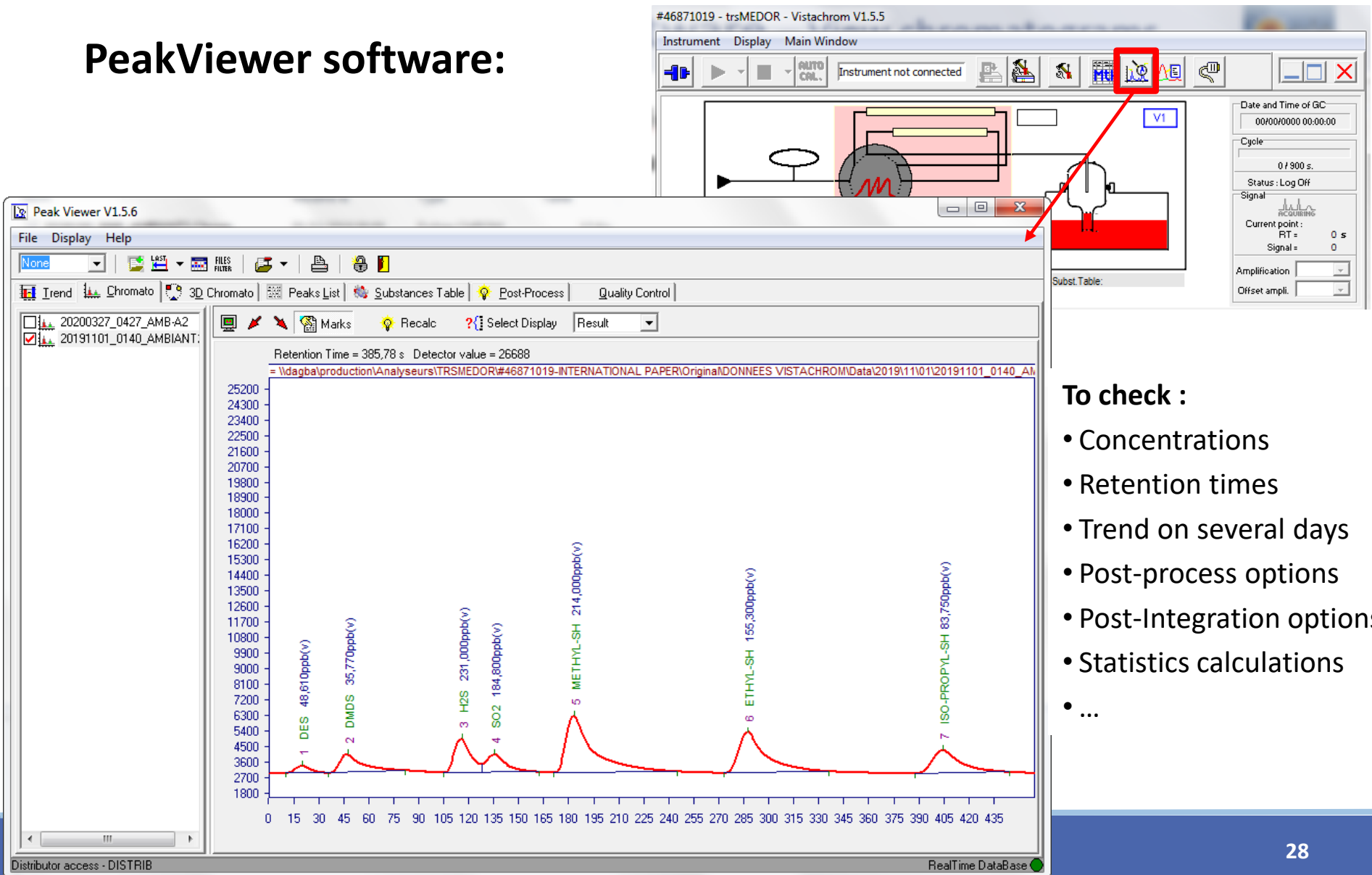


**Data storage:** 

- Data is stored as raw chromatograms and ASCII files (Excel)
- Data files are recorded and stored with date, time, and method stamp
- Data can be transmitted to data acquisition system via Modbus protocol, 4-20mA module, ...

# Software – View chromatograms

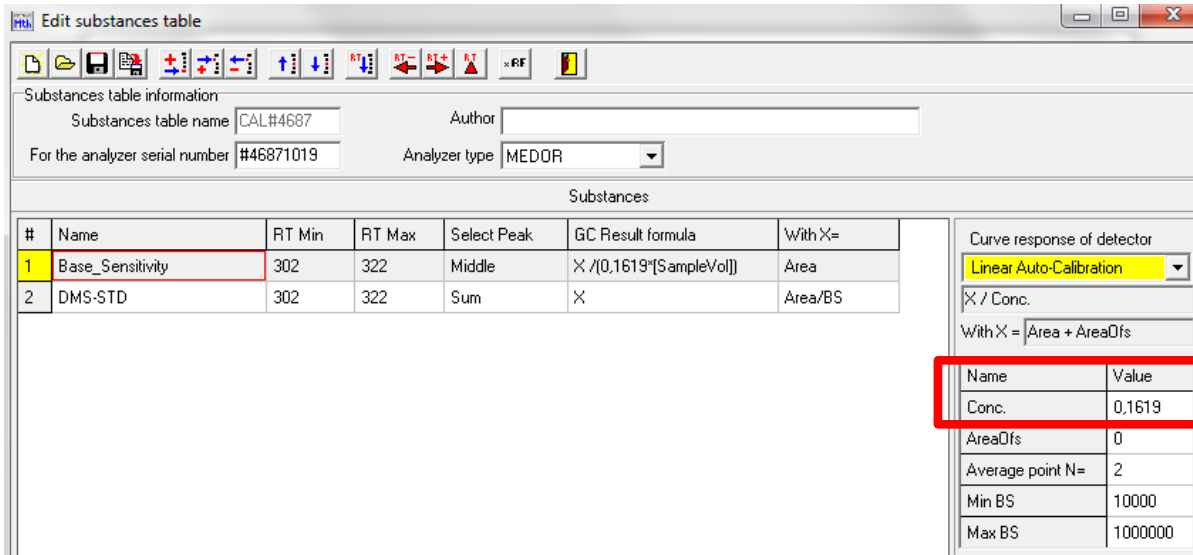
## PeakViewer software:



# Calibration – “Auto-Cal”

## How to use the « Auto-Cal » option?

- Write the expected calibration gas concentration in the calib substance table :



Substances table information

Substances table name: CAL#4687 Author: [ ]

For the analyzer serial number: #46871019 Analyzer type: MEDOR

#	Name	RT Min	RT Max	Select Peak	GC Result formula	With X=
1	Base_Sensitivity	302	322	Middle	X / (0.1619 * [SampleVol])	Area
2	DMS-STD	302	322	Sum	X	Area/BS

Curve response of detector

Linear Auto-Calibration

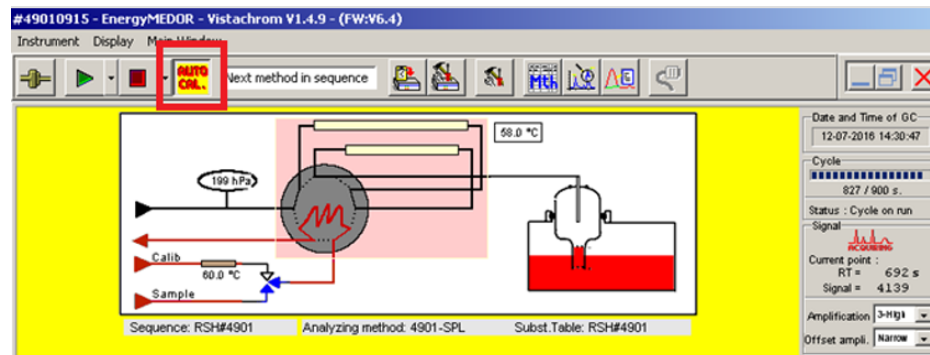
X / Conc.

With X = Area + AreaOfs

Name	Value
Conc.	0.1619
AreaOfs	0
Average point N=	2
Min BS	10000
Max BS	1000000

Unit : mg/m<sup>3</sup>

- The « Auto-Cal » option must be ON:



## How the Base Sensitivity (BS) is calculated automatically?

$$BS = \frac{RF \cdot Area}{C}$$

Parameter	Unit	Name	Remark
BS	au/(mg/m <sup>3</sup> )	Base Sensitivity	BS is used to know the sensitivity of an instrument
RF	None	Response Factor	RF is a constant value, displayed in the substance table, for each chemical compound
Area	au	Area below a peak	Area displayed below each peak on a chromatogram
C	mg/m <sup>3</sup>	Concentration	

## Goal of using « BS » parameter:

- Only one calibration gas is required to calibrate the instrument for all the species
- Relative response factors are used to compare a compound to the reference compound
- Follow automatically the sensitivity of the instrument in time

## Every week:

- Check the chromatograms (nice base line, stable BS, peaks identification, ...)

## Every month:

- Chromic acid level check (add deionized water if needed)
- Check the operating parameters : Pressures, flows, temperatures
- Check visually the detector installation : no bubble

## Every year:

- Do the preventive maintenance actions, replacing the PM parts
- Full check of the instrument : Preset, flows, pressures, sensitivity, RF adjustments...

# Service – tools required

## Tools you absolutely must have:



Classic tool case:



Leak detector



**ELECTRONIC FLOWMETER**  
(RANGE: 1 - 750 ML/MIN)  
(TESTED)  
CS\_OT\_00005-3000

Flowmeter



Several Swagelok  
fittings  
(1/8 and 1/4 size)



Flow regulator



Some meters of  
PTFE tubes

## Tools advised for advanced users (distributors):



**TRAP TOOL FOR PRESET FOR  
CALIBRATION (TESTED)**  
CS\_OT\_00012-0001



**ELECTRONIC MANOMETER  
ASSY (RANGE: -1 À 2 BARS  
(RELATIVE PRESSURE))  
(TESTED)**  
CS\_SE\_00007-MANO



**MULTIMETER WITH  
THERMOCOUPLE K OPTION  
(TESTED)**  
CS\_OT\_00016-0000



**CALIBRATION RESISTORS SET  
FOR TEMPERATURE PRESET  
(TESTED)**  
CS\_EL\_00010-0001



# Preventive maintenance kits



## « One year PM kit »:

Item number	Designation	Qty
<b>Analyser</b>		
EP_SA_00004-0001	Membran and valves Kit airmoPUMP	1
CS_PN_00005-0110	Rotor 10 ports 1/8"	1
<b>Internal Calibration</b>		
AR_TU_09002-0000	O-Ring 1.5 x 0.75 mm Nitril	10
CS_TU_09000-0000	O-ring OR 22.5 x 1.5	1
CS_CL_00108-0001	Permeation tube DMS - around 60 ng/min - 45°C (airmotec certified at $\pm 10\%$ )	1

## “3 years PM kit”:

Item number	Designation	Qty
<b>Analyser</b>		
CS_PN_00005-0012	Pneumatic actuator 10 ports	1
CS_PN_00004-0024	Distributor 24V	1
AR_EL_01033-0000	Set of fuses (3 x 3,15A - 1A - 315mA - 50mA)	1
CS_PN_06331-0341	3-way solenoid valve stainless steel (1/8")	1
CS_TU_00000-FRAC	Selection solenoid valve fittings kit	1
<b>Internal PC</b>		
GC_CP_00001-0001	Fan (int) (Only for MK1 and MK2 computer)	1
IT_CP_00340-0128	Hard disk 128Go SSD 2,5 (SATA connection) since 03/2012	1

## “5 years kit”:

Item number	Designation	Qty
<b>Analyser</b>		
CS_CT_01000-CPUT	CPU Board, tested, Incl. Memory supply and H8	1

# Troubleshooting



Symptom	Probable cause	Corrective action
<b>Noisy/irregular base line</b>	Problem on the glass detector installation (gas bubble, dust, ...)	Clean the detector, dry it and reinstall it in liquid solution Check the vibrations present in the environment
	Electronic noise	Check the electrodes are well connected /reconnect them
<b>Peaks not identified</b>	Head column pressure is out of range	Check air pressure applied to the GC : 3 bars Adjust the HCP checking the QC report Adjust the RT ranges in the substance tables
	Oven temperature is not correct	Check that the environment temperature is stable Check the PT1000 temperature sensor is well connected
<b>Base Sensitivity is not correct</b>	The calibration flow is not correct	Check and adjust the calibration flow
	The permeation oven T is not correct	Check the Calib T according to the QC report
	The expected concentration of DMS is not correct	Check and adjust this concentration (in mg/m <sup>3</sup> ) in the calib substance table
	BS is out of range	Check in the calib substance table, the experimental BS is in the expected BS range
	Permeation tube is empty	Replace the permeation tube : every year
	Glass detector is dirty	If the BS is too low: clean the detector with HCl (10%) during 30min, water, acetone. Dry it and reinstall it.

# Troubleshooting

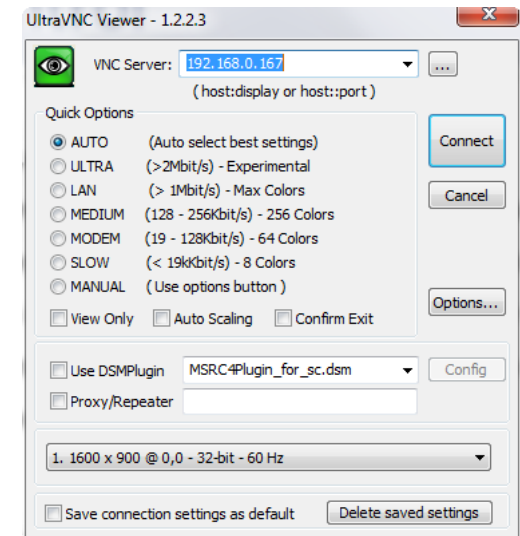


Symptom	Probable cause	Corrective action
<b>No detection, Flat base line</b>	Offset setting is not correct	Adjust the offset to have the signal between 0 and 65000 If « auto-offset option » is used, check the configuration is OK
	Sample flow is not correct	Switch On the sampling pump Adjust the sampling flow, measuring it with a flowmeter (refer to QC report)
	The injection valve does not actuate	Check gas pressure applied on the valve : 3 bar Check injection valve functioning Replace the PM parts of the valve : rotor, actuator...
	The glass detector is not installed correctly	Clean the detector, dry it and reinstall it in liquid solution
<b>Impossible to log on</b>	GC is OFF (LEDs OFF on the front panel)	Use the internal Power switch to switch On the GC
	COM port used by Vistachrom is not the right one	Change the COM port used by Vistachrom
	Electronic bug	Start a « Hard reset »
<b>Other strange phenomenons</b>	Electronic/software bug	Start a « Hard reset »

# Remote control

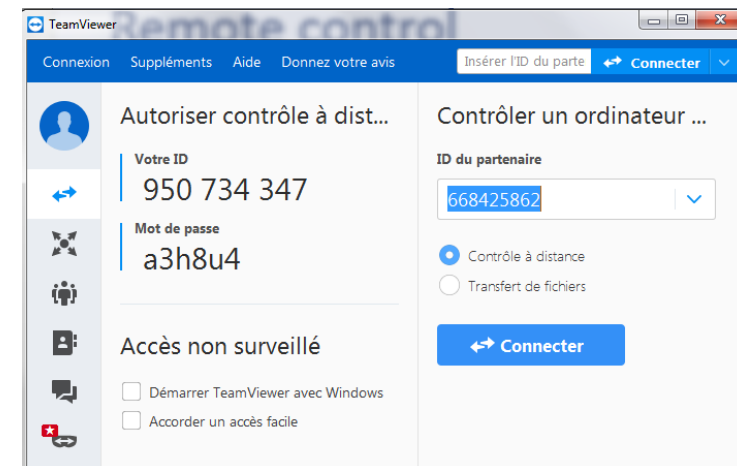
## UltraVNC:

- Easy to use for local area connections
- On the Chromatotec computer, the software is automatically started at Windows start up
- On the remote computer, just write the IP address of the Chromatotec computer



## TeamViewer:

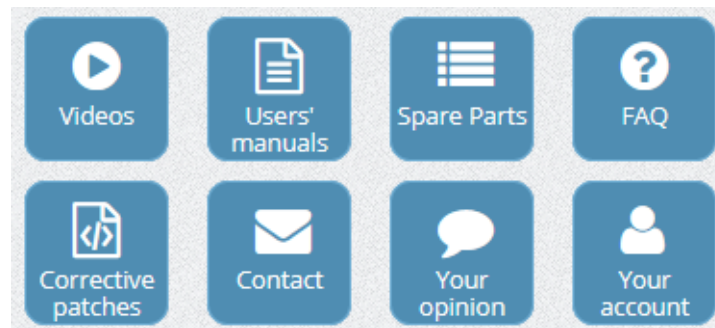
- Easy to use for connections through internet
- On the Chromatotec computer, start the software from: D/TeamViewer
- On the Chromatotec computer, write down the IP and password written in TeamViewer
- On the remote computer, just write these ID and password



# Visit our technical website

We highly recommend you to have a look to our technical website.

<https://support.chromatotec.com/>



It is really helpful to:

- ✓ Start
- ✓ Understand the GC functioning
- ✓ Calibrate
- ✓ Maintain
- ✓ Solve a problem

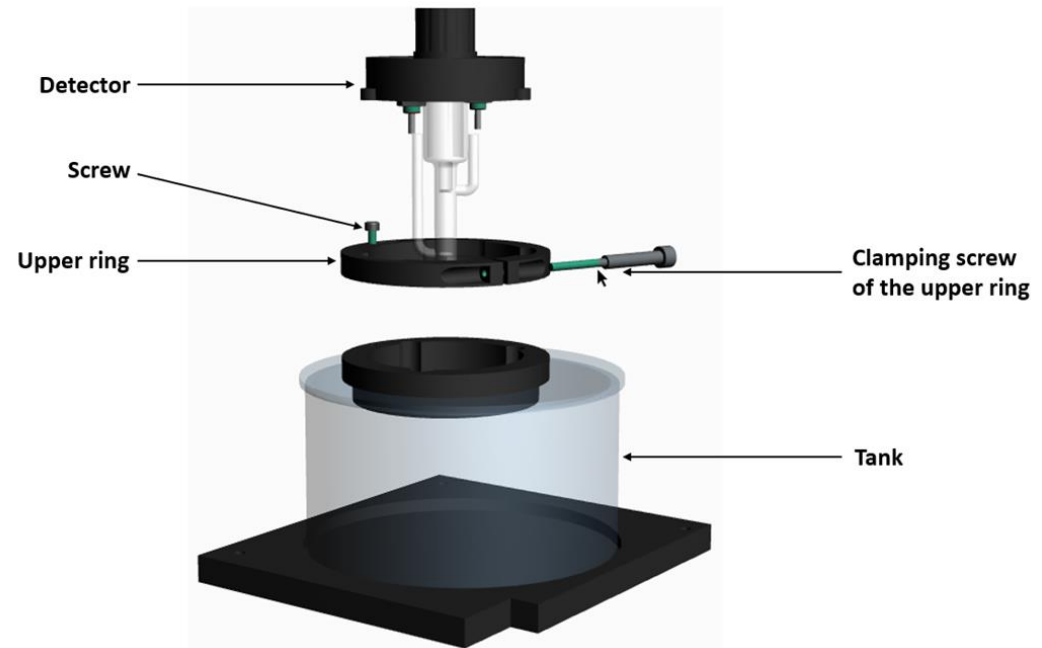
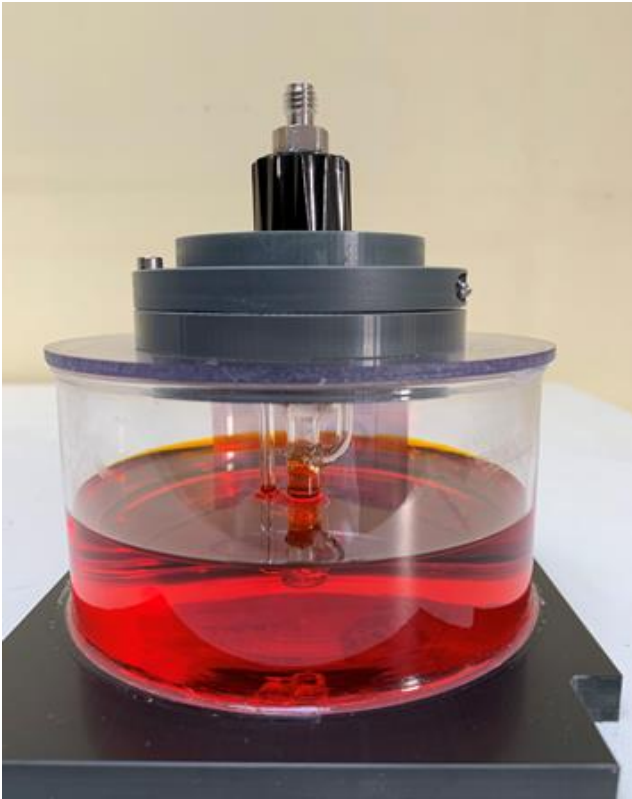
# Thanks!

Thanks for choosing the Medor !



# Detector- new design for the future

- New tank





# Detector- new design for the future

- New detector

